REMARKS

Favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claims 37-85 are cancelled without prejudice.

Claim 28 is amended to be dependent upon claim 17. Rejoinder of claims 28-36 is requested upon an allowance of claims 17-27.

Claims 86-87 are added. Claim 86 is supported by claims 17 and 23. Claim 87 corresponds to claim 24.

Claims 88-89 are added. Claims 88-89 correspond in category to claims 9-10 of USP 6,054,270. Rejoinder of claims 88-89 is requested upon an allowance of claims 17-27.

The Examiner is respectfully requested to acknowledge the claim for foreign priority and to acknowledge receipt of the certified priority document in the parent application.

The provisional rejection of claims 17-27, 37-41, 46-51 and 55-63 on the ground of obviousness-type double patenting over certain claims of U.S. application Serial No. 09/422,803 is overcome in view of the abandonment of the '803 application.

The provisional rejection of claims 37-41, 46-51 and 55-63 on the ground of obviousness-type double patenting over certain claims of U.S. application Serial No. 09/422,804 is overcome in view of the abandonment of the '804 application.

The provisional rejection of claims 17-27, 37-41, 46-51 and 55-63 on the ground of obviousness-type double patenting over certain claims of U.S. application Serial No. 10/115,077 is requested to be held in abeyance. Furthermore it is respectfully submitted that such rejection is untenable, because the instant claims require a "porous material attached to the impermeable surface; and an array of oligonucleotides with predetermined sequences attached to the porous material". Such feature is not suggested by the claims of copending application Serial No. 10/115,077.

Claims 17-27, 37-41, 46-51 and 55-63 are rejected under 35 USC 112, second paragraph, as being indefinite in the recitation "oligonucleotides with predetermined sequences". This ground of rejection is respectfully traversed.

The rejection states that the instant claims are ambiguous with respect to the recitation "oligonucleotides with predetermined sequences" because it is unclear what the oligonucleotides are predetermined with respect to. Such position is respectfully submitted to be untenable.

As indicated in the Applicant's amendment dated November 21, 2006, the recitation at issue requires the oligonucleotides of all claims to have predetermined sequences. The term "predetermined" corresponds to the same claim recitations found in the independent claims of U.S. Patent No. 5,700,637 and U.S. Patent No. 6,054,270. Such claim recitations were added to the claims of the '637 and '270 patents after interviews with Examiner Ardin Marschel in each application. In those applications the Examiner had contended that the former claim recitation regarding the oligonucleotides having "defined" sequences may have been indefinite in that any polynucleotide sequence is inherently capable of being defined. The Examiner agreed that the recitation of the oligonucleotides having "predetermined sequences" was definite and helped to define over the prior art. As stated in the reasons for allowance by the Examiner in the application issuing as the '270 patent, "... the phrase "predetermined sequences" ... is interpreted to require that the complete sequence of each and every oligonucleotide probe on the array surface is known during the practice of the instant claim steps."

The Applicant explicitly adopts and intends to be bound to this meaning of the recitation. In other words, the claimed apparatus has an array of oligonucleotides in which the complete sequence of each and every oligonucleotide probe on the array surface is known.

In addition, the Applicant would inform the USPTO that U.S. Patent No. 5,700,637 and U.S. Patent No. 6,054,270 have been involved in several patent infringement litigations in the U.S. The claims have been construed by district courts on more than one occasion, and no court has expressed any concern about the definiteness of this recitation.

It is also respectfully submitted that the meaning of the recitation is clear from the specification. See for example page 2, line 15 to page 3, line 8 of the substitute specification.

In view of the foregoing, favorable reconsideration and withdrawal of the rejection is solicited.

Claims 37, 39, 40, 46, 55, 57, 58, 61, 48, 69 and 63 are rejected under 35 USC 102 as anticipated by Stavrianopoulos. This ground of rejection is overcome in view of the cancellation of these claims.

In item 7 on page 7 of the Action, it is incorrectly stated that the application names joint inventors. The application has a single inventor.

Lastly, claims 17-27, 37-41, 46-48 and 52-63 are rejected under 35 USC 103 as obvious from Stavrianopoulos and Matkovich. This ground of rejection is respectfully traversed.

Neither cited reference teaches or suggests the apparatus of claims 17-27. Claims 17-27 require "a support having an impermeable surface; porous material attached to the impermeable surface; and an array of oligonucleotides with predetermined sequences attached to the porous material".

Neither cited reference teaches or suggests attaching an array of oligonucleotides with predetermined sequences to a support according to claim 17. Stavrianopoulos describes products in the opposite orientation to the claimed invention. In Stavrianopoulos a nucleic acid of unknown sequence to be analyzed is immobilized on a support, and a probe with a known sequence is applied to the immobilized sequence (a "target down" assay). None of the products disclosed by Stavrianopoulos has an immobilized oligonucleotide with a predetermined sequence. The immobilized sequences in the Stavrianopoulos method are the analyte having an unknown sequence rather than the probe.

Regarding claims 23, 24, 88 and 89, the Applicant can find no disclosure in Stavrianopoulos of a covalent attachment of the oligonucleotides to the support according to claims 23 and 88, or a terminal attachment of the oligonucleotides to the support according to claims 24 and 89. Column 5, line 58 to column 6, line 4 of Stavrianopoulos is referenced in the rejection. This disclosure teaches covalently attaching a chemical label to the probe. This disclosure is irrelevant to covalently attaching an array of oligonucleotides having a predetermined sequence to a support. Column 8, lines 11-56 of Stavrianopoulos (Example 1) is also referenced in the rejection. However this disclosure

relates to immobilizing or "fixing" a negatively charged oligonucleotide to a support by coating the support with a positively charged alkylamine layer. Example 1 binds DNA to the glass by a +ve/-ve interaction. Thus the Stavrianopoulos method involves ionic attachment of the oligonucleotides to the support, not covalent attachment according to the claimed method.

Matkovich does mention covalent binding once (col. 4, last line), but only in passing and only with regards to an antibody assay. Matkovich's initial suggestion is physical bonding, and covalent chemical coupling is merely mentioned as "some manner" of attachment.

Advantages of selecting covalent coupling of oligonucleotides in a DNA array for a hybridization assay were appreciated by the instant inventor and include:

(i) a defined covalent linkage offers better consistency than the random non-covalent attachment used in the cited prior art;

(ii) covalent bonding permits the attachment of short oligonucleotides to a support while retaining their ability to hybridise, but this is very difficult when using non-covalent methods; and

(iii) covalent bonds are more durable and so the array products can be re-used more frequently.

These advantages were certainly not suggested by the antibody assay of Matkovich.

Moreover, where Stavrianopoulos mentions a “parallel” analysis system, the analyte sequences are immobilized in different reaction containers e.g. different wells of a microtitre plate. The Applicant does not agree that different wells on a plate would be “an impermeable surface” of a support; rather, they are separate surfaces. For example, a sample applied to one well would not be able to hybridize to nucleic acids in another well, because the immobilized nucleic acids are on separate surfaces.

Furthermore, it is respectfully submitted that a skilled person would not reasonably have combined the teachings of Stavrianopoulos with Matkovich. Stavrianopoulos deals with nucleic acid assays. Matkovich on the other hand is explicitly concerned with antibody assays. See for example the "Background" section, culminating with the statement "Accordingly, there remains a need for improvements in multiwell

plates to provide for *** increased antibody binding *** in a more reliable manner". In addition, the "Summary of the Invention" section refers to surfaces "capable of binding antibody", etc.

A skilled person starting with the DNA assay of Stavrianopoulos would not have looked to the teachings of Matkovich because it is from a different technical field (antibodies vs. DNA). Such combination is respectfully submitted to be hindsight. Even if a skilled person had looked at Matkovich to improve DNA assays, they would not be guided in particular to choose covalent bonding because (i) it is mentioned only in passing, with other attachments being equally likely, and (ii) Matkovich concerns antibodies and so offers no useful teaching about how to attach DNA. Thus, the rejection requires the skilled person to make an unlikely combination of documents, and then to make a specific selection that was not made by Matkovich himself. This chain of connections would not have been made by one of ordinary skill.

Lastly, Stavrianopoulos had already considered attachment of DNA to porous materials, but found them less desirable. Please see the end of the third paragraph in "Summary of the Invention" section. Why would the skilled person reject Stavrianopoulos's preference, then look to an antibody-related document, and then select covalent attachment in particular, to improve upon the DNA assay of Stavrianopoulos? It is respectfully submitted that such combination of selected teachings in the art must be based upon improper picking and choosing using hindsight.

Moreover, there is no mention or suggestion in Stavrianopoulos or Matkovich of a covalent terminal attachment of nucleic acids to a support, according to claims 24 and 89.

In summary, the claimed invention would not have been obvious to one of ordinary skill in the art at the time of this invention from the combined teachings of the cited references.

The Examiner is advised that an Office Action has been issued in copending application Serial No. 10/115,077.

The Examiner is also advised that ex parte Requests for Reexamination have been filed with respect to certain claims in U.S. Patent No. 6,054,270 and U.S. Patent No. 5,700,637. Reexamination of claims 9 and 10 of the '270 patent, and reexamination of

claim 1 of the '637 patent, was recently ordered. It is noted that none of the three re-examined claims mentions attachment via a porous material.

Favorable action and allowance is solicited.

Respectfully submitted,

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